UNITED STATES DEPARTMENT OF COMMERCE
National Telecommunications and Information Administration
Washington, D.C. 20230

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July 26, 1999

Ms. Magalie Roman Salas
Secretary
Federal Communications Commission
The Portals
445 Twelfth Street, S.W.
Washington, D.C. 20554

Re: The Establishment of Policies and Service Rules for the Mobile Satellite in the 2 GHz, IB Docket No. 99-81, RM-9328

Dear Ms. Salas:

Enclosed please find one original and six copies of the Reply Comments of the National Telecommunications and Information Administration in the above-referenced docket and rulemaking. The comments were also submitted in electronic form on diskettes in WordPerfect 5.1 to Christopher J. Murphy with the International Bureau and delivered to the Commission's copy contractor, International Transcription Service.

Please direct any questions you may have regarding this filing to the undersigned. Thank you for your cooperation.

Respectfully submitted,

Kathy Smith
Acting Chief Counsel

cc: Christopher J. Murphy, International Bureau
International Transcription Service

Enclosures

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Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

In the Matter of	)	
	)	
The Establishment of Policies	)	IB Docket No. 99-81
and Service Rules for the Mobile	)	RM-9328
Satellite Service in the 2 GHz Band	)	

REPLY COMMENTS OF THE NATIONAL TELECOMMUNICATIONS AND INFORMATION ADMINISTRATION

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Table of Contents

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In the Matter of	)	
	)	
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REPLY COMMENTS OF THE NATIONAL TELECOMMUNICATIONS AND INFORMATION ADMINISTRATION

The National Telecommunications and Information Administration (NTIA) respectfully submits the following Reply Comments in response to the Commission's Notice of Proposed Rulemaking in the above-captioned proceeding.[1] Specifically, NTIA addresses comments concerning the narrow band emission limit proposed by the Commission, the modification of the new Section 25.216(b) proposed by the Commission, the voluntary certification of 2 GHz mobile satellite service (MSS) terminals, and Enhanced 9-1-1 (E911) capabilities for 2 GHz MSS terminals.

I. THE NARROW BAND OUT-OF-BAND EMISSION LIMIT PROPOSED BY THE COMMISSION IS NECESSARY TO PROTECT GNSS RECEIVERS AND SHOULD EXTEND ACROSS THE 1559-1626.5 MHz BAND.

In the 2 GHz MSS Notice of Proposed Rulemaking the Commission proposes to adopt out-of-band emission limits for MSS terminals operating in the 1990-2025 MHz band. Specifically, for 2 GHz MSS terminals the Commission proposes a wide band equivalent

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[1] *The Establishment of Policies and Service Rules for the Mobile Satellite Service in the 2 GHz Band*, IB Docket No. 99-81 and RM No. 9328, FCC 99-50 (rel. Mar. 25, 1999) (*2 GHz MSS NPRM*).

isotropically radiated power (EIRP) density limit for out-of-band emissions of -70 dBW/MHz and a narrow band EIRP limit of -80 dBW for discrete spurious emissions of less than 700 Hz bandwidth in the 1559-1605 MHz band.[2] In the 1605-1610 MHz portion of the band, the Commission proposes to adopt limits of -70 dBW/MHz at 1605 MHz and -10 dBW/MHz at 1610 MHz with the levels in between determined by linear interpolation.[3] These out-of-band emission limits and the frequency range over which they are specified are consistent with the Commission's proposal in the pending Global Mobile Personal Communications by Satellite (GMPCS) proceeding addressing MSS terminals operating in the 1610-1660.5 MHz band.[4] The Commission notes that the International Telecommunication Union-Radiocommunication Sector (ITU-R) has adopted Recommendation M.1343 for licensing administrations concerning regulatory limits on out-of-band emissions from MSS terminals licensed for transmission to non-geostationary satellites in the frequency bands between 1 and 3 GHz.[5] The Commission also states that similar limits were adopted by the European Testing and Standards Institute (ETSI) in

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[2] *Id.* ¶ 116.

[3] *Id.*

[4] *Amendments of Parts 2 and 25 to Implement the Global Mobile Personal Communications by Satellite (GMPCS) Memorandum of Understanding and Arrangements and Petition of the National Telecommunications and Information Administration to Amend Part 25 of the Commission's Rules to Establish Emissions Limits for Mobile and Portable Earth Stations Operating in the 1610-1660.5 MHz Band*, IB Dkt. No. 99-67 and RM No. 9165, FCC 99-37 (rel. Mar. 5, 1999) (*GMPCS NPRM*).

[5] *2 GHz MSS NPRM* ¶ 116 (citing Recommendation ITU-R M.1343, *Essential Technical Requirements of Mobile Earth Stations for Non-geostationary Mobile Satellite Service Systems in the Bands 1-3 GHz* (ITU-R M.1343)).

TBR-042 and apply to geostationary and non-geostationary mobile earth terminals.[6] For 2 GHz MSS terminals both ITU-R M.1343 and ETSI TBR-042 specify the wide band out-of-band emission limit over the 1559-1626.5 MHz frequency range.[7]

Several MSS system operators recommend that the Commission adopt out-of-band emission limits that are consistent with ITU-R M.1343 and ETSI TBR-042.[8] Since the ITU-R Recommendation and the ETSI standard do not specify a narrow band out-of-band emission limit, the views of these commenters is unclear with regard to the Commission's proposed adoption of a narrow band limit for the 2 GHz MSS terminals. NTIA, nevertheless, strongly supports the adoption by the Commission of the proposed narrow band out-of-band emission limit. The narrow band out-of-band emission limit is necessary to protect Global Navigation Satellite System (GNSS) receivers used for precision approach aircraft landings. The GNSS includes the U.S. Global Positioning System (GPS), the Russian Federation Global Navigation Satellite System (GLONASS) and their augmentation systems.

The GPS and Wide Area Augmentation System (WAAS) receivers process the Standard Positioning Service (SPS) Coarse/Acquistion (C/A) code signal centered at 1575.42 MHz.[9] The

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[6] *Id.* (citing European Testing and Standards Institute TBR-042, *Satellite Personal Communications Networks (S-PCN); Mobile Stations, for S-PCN in the 2.0 GHz Band Under the Mobile-Satellite Service (MSS) Terminal Essential Requirements* (Feb. 1998) (ETSI TBR-42)).

[7] *See* ITU-R M.1343 at 16 and ETSI TBR-42 at 15.

[8] *See, e.g.,* Comments of Iridium LLC (Iridium Comments), IB Dkt. No. 99-81, at 62 (June 24, 1999); Comments of ICO Services Limited (ICO Comments), IB Dkt. No. 99-81, at 22-23 (June 24, 1999); Comments of Globalstar L.P.(Globalstar Comments), IB Dkt. No. 99-81, at 49-50 (June 24, 1999); Comments of Inmarsat LTD. (Inmarsat Comments), IB Dkt. No. 99-81, at 20 (June 24, 1999).

[9] The GPS SPS signal extends through the band 1563.42 to 1587.42 MHz.

spectrum of the C/A code signal consists of a two sided bandwidth with a $[\sin(x)/x]^2$ envelope with nulls at n/T_c, (n*1.023 MHz), where T_c is the psuedo random noise (PRN) code chipping period.

The exact impact of interference to a GPS or WAAS receiver is dependent primarily on the type of interference. GPS and WAAS receivers using the C/A code are known to be susceptible to narrow band interference mainly because of the relatively short period of the C/A code.[10] With a period of 1 millisecond, the C/A code spectrum is not continuous, but rather it is a line spectrum with discrete lines at 1 kHz intervals. In addition, there are some "strong lines" in each C/A code that can deviate significantly from a $[\sin(x)/x]^2$ envelope. This makes a C/A code receiver vulnerable to continuous wave or very narrow band interfering signals since they can mix with a strong C/A code line and leak through the correlator.[11]

The narrow band out-of-band emissions from MSS terminals operating in the 1990-2025 MHz band may be continuous wave if they are synthesizer spurs or they may be modulation artifacts having somewhat wider bandwidths. Because some spectral lines can be as much as 10 dB higher than the $[\sin(x)/x]^2$ envelope, the susceptibility of the C/A code to extremely narrow band interference can increase by approximately 10 dB.[12] This means that the power of a narrow band interfering signal must be 10 dB lower than that of a wide band interfering signal to protect

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[10] *See* RTCA Inc., Special Committee No. 159, *Assessment of Radio Frequency Interference Relevant to the GNSS*, Document No. RTCA/DO-235, at C-4 (Jan. 27, 1997) (RTCA/DO-235).

[11] A correlator is that section of a spread spectrum system in which a received signal and the local reference are compared for agreement. The desired, synchronized signal is despread and undesired signals are spread.

[12] Christopher J. Hegarty, *Analytical Derivation of Maximum Tolerable In-Band Interference Levels for Aviation Applications of GNSS*, J. Inst. of Navigation, Mar. 1997, at 25, 27.

GPS and WAAS receivers.

The GLONASS Standard Accuracy Signal (SAS) has a code that is similar to the GPS C/A code. The SAS code employs a pseudo-random code that has a chip rate of 0.511 MHz and a period of 1 millisecond. Therefore, the impact on GLONASS SAS code receivers to increasingly narrow band interfering signals will be essentially the same as the impact on a GPS C/A code receiver. The International Civil Aviation Organization (ICAO) continues to work to incorporate GLONASS into the GNSS on an equal basis with GPS. The operation of GLONASS frequencies should be fully protected in the U.S. airspace because it will be used by non-U.S. aircraft operating in U.S. airspace. Such aircraft are permitted to use the U.S. airspace under Chapter 2 of the Convention of International Civil Aviation and may use GLONASS as their sole means of navigation.[13]

Finally, the need for 10 dB of additional protection from narrow band interference for GPS C/A and GLONASS SAS receivers is documented in a recently developed ITU-R Draft New Recommendation (DNR) for the technical characteristics of radionavigation satellite service receivers to be used in interference studies.[14] This DNR was approved at the April 1999 meeting of ITU-R Working Party 8D.

Based on the susceptibility of GPS and WAAS C/A code and GLONASS SAS receivers to narrow band interference, NTIA supports the Commission's proposal to adopt both a wide band and a narrow band limit for the out-of-band emissions in the 1559-1610 MHz band for

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[13] Convention on International Civil Aviation, Chapter 2 (Chicago, 1947).

[14] *See* Draft New Recommendation ITU-R M.[RNSS.CHAR]. Technical Characteristics of Current and Prospective RNSS (Space-to-Earth) and ARNS Receivers to be Considered in Interference Studies in the Band 1559-1610 MHz.

MSS terminals operating in the 1990-2025 MHz band. Furthermore, in order to facilitate the deployment and free circulation of 2 GHz MSS terminals, NTIA recommends that the Commission extend the wide band and narrow band out-of-band emission limits across the 1559-1626.5 MHz band to maintain consistency with internationally adopted recommendations and other relevant standards.

II. A BANDWIDTH OF 300 Hz SHOULD BE ADOPTED FOR THE MEASUREMENT OF 2 GHz MSS TERMINAL NARROW BAND OUT-OF-BAND EMISSIONS.

The Commission has proposed to adopt a narrow band EIRP limit of -80 dBW for spurious emissions of less than 700 Hz bandwidth.[15] This proposal is consistent with the recommendations made in the petition for rulemaking filed by NTIA for MSS terminals in the 1610-1660.5 MHz band.[16] However, NTIA would like to clarify that the 700 Hz was never intended to be the bandwidth used for the narrow band out-of-band emission measurements. This value was taken from the RTCA Special Committee report and represents a break point to distinguish between the narrow band and wide band interference susceptibility levels of GNSS receivers.[17] NTIA believes that narrow band emissions can be measured more accurately using a measurement bandwidth less than 700 Hz. Therefore, it would be appropriate to measure the total power for the narrow band out-of-band emissions with a 300 Hz resolution bandwidth

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[15] *2 GHz MSS NPRM* ¶ 116 (citing *GMPCS NPRM* ¶¶ 94-96); *see also id.* at page 72 (adding proposed new section 25.216(a)(5) which defines the narrow band emissions of less than 700 Hz bandwidth).

[16] *See* NTIA Petition for Rulemaking, Amendment to the Commissions Rules to Incorporate Mobile Earth Station Out-of-Band Emissions, RM No. 9165, at 3 (Sept. 19, 1997) (Public Notice, Report No. 2227 (Sept. 23, 1997)).

[17] *See* RTCA/DO-235 at G-1.

currently available on existing spectrum analyzers. NTIA recommends that the Commission adopt 300 Hz for the measurement bandwidth of narrow band emissions in the 1559-1626.5 MHz band.

III. PROPOSED SECTION 25.216(b) OF THE COMMISSION'S RULES SHOULD BE REVISED TO INCLUDE MSS TERMINAL OUT-OF-BAND EMISSION LIMITS ABOVE 1605 MHz.

In reference to Part 25 of its Rules, the Commission proposes to add a new Section 25.216 specifying the limits on out-of-band emissions from MSS terminals operating in the 1610-1660.5 MHz and 1990-2025 MHz bands for the protection of the radionavigation satellite service (RNSS) below 1605 MHz and above 1605 MHz.[18] As indicated in NTIA's initial comments in this proceeding, the out-of-band emission limits above 1605 MHz should be different for MSS terminals operating in the 1610-1660.5 MHz and 1990-2025 MHz bands based on the limits adopted by both the ITU-R and ETSI.[19] Several commenters recommended that the Commission adopt international recommendations and other relevant standards for the out-of-band emission limits of MSS terminals operating in the 1990-2025 MHz band.[20] The proposed new Section 25.216(b) of the Commisson's Rules does not specify the actual out-of-band emission limits above 1605 MHz, but instead states that interference to RNSS transmissions will be resolved on a case-by-case basis. NTIA disagrees with this approach and recommends that

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[18] *2 GHz MSS NPRM* ¶ 116 (citing *GMPCS NPRM* ¶ 83); *see also id.* at pages 72-73 (adding proposed new section 25.216(b) which addresses out-of-band emissions of MSS terminals above 1605 MHz).

[19] Comments of the National Telecommunications and Information Administration (NTIA Comments), IB Dkt. No. 99-81, at 10-11 (June 24, 1999).

[20] *See, e.g.*, Iridium Comments at 62; ICO Comments at 22-23; Globalstar Comments at 49-50; Inmarsat Comments at 20.

the Commission revise its proposed new Section 25.216(b) to include the actual levels of out-of-band emission limits above 1605 MHz for MSS terminals operating in the 1610-1660.5 MHz and 1990-2025 MHz bands.[21]

IV. A VOLUNTARY CERTIFICATION OR TYPE APPROVAL PROCESS FOR MSS TERMINALS SHOULD NOT EXEMPT THEM FROM THE OUT-OF-BAND EMISSION LIMITS IN THE 1559-1626.5 MHz BAND.

In its comments, Iridium recommends that the U.S. certification or type approval process should be voluntary, not mandatory.[22] In addition, the GMPCS Memorandum of Understanding (GMPCS-MoU) is voluntary and is focused on the need to promote transborder use of equipment. Regardless of whether a mandatory or voluntary process is adopted, NTIA recommends that the Commission still require that all MSS terminals operating in the 1990-2025 MHz band comply with the wide band limit of -70 dBW/MHz and the narrow band limit of -80 dBW in the 1559-1626.5 MHz band.

V. THE COMMISSION SHOULD CREATE A FACT-FINDING COMMITTEE TO DEVELOP NATIONAL STANDARDS AND PSAP DATABASES.

NTIA reiterates its belief that the ability to locate wireless terminal users in distress is in the public interest.[23] NTIA agrees with the Association of Public-Safety Communications Officials-International, Inc. that MSS users are likely to have the same expectations as cellular

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[21] For MSS terminals operating in the 1610-1660.5 MHz, these limits are -70 dBW/MHz at 1605 MHz and -10 dBW/MHz at 1610 MHz, with the levels in between determined by linear interpolation. For MSS terminals operating in the 1990-2025 MHz band these limits are -70 dBW/MHz and -80 dBW from 1605-1626.5 MHz.

[22] Iridium Comments at 56.

[23] NTIA Comments at 15.

and PCS users when making emergency 911 calls.[24] The importance of MSS terminals that facilitate E911 capabilities becomes more evident in areas that are not serviced by cellular or Personal Communication Service (PCS) systems and also in situations where the caller is not able to identify his or her location.[25] NTIA believes that in examining this issue the Commission should not lose sight of its purpose to promote the "safety of life and property through the use of wire and radio communication."[26]

Several 2 GHz MSS applicants commented that the state of mobile-satellite technology being deployed makes requiring implementation of E911 capabilities premature.[27] The commenters further state that routing an E911 call from the MSS gateway through the public switched telephone network to the appropriate Public Safety Answering Point (PSAP) will be difficult in true emergencies.[28] The commenters also state that the 2 GHz MSS terminals will have international implications requiring careful planning and implementation of E911 services.[29] However, Celsat America Inc. (Celsat) states that it is willing to accept a Commission

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[24] Comments of Association of Public-Safety Communications Officials-International, Inc. (APCO Comments), IB Dkt. No. 99-81, at 2 (June 24, 1999).

[25] *Id.* at 3; Comments of the United States Coast Guard (USCG Comments), IB Dkt. No. 99-81, at 7 (June 24, 1999).

[26] *Communications Act of 1934*, 47 U.S.C. § 151 (1998).

[27] *See, e.g.*, Iridium Comments at 48; Globalstar Comments at 43; Comments of Constellation Communications Inc. (Constellation Comments), IB Dkt. No. 99-81, at 26 (June 24, 1999).

[28] Globalstar Comments at 42; Constellation Comments at 27.

[29] Commenters argue that E911 implementation is an issue that should be left for the ITU to study, providing an effective mechanism for the international community to establish global emergency calling standards. *See* Iridium Comments at 47; Globalstar Comments at 43.

requirement that all 2 GHz MSS applicants provide E911 capabilities regardless of their stage of development or whether they are designed to complement terrestrial systems.[30] Celsat further states that at this stage of the 2 GHz MSS proceeding such a requirement is fully consistent with technological capabilities of MSS systems which may not initiate service for many years.[31] The U.S. Coast Guard supports implementation of position location and E911 capabilities in 2 GHz MSS terminals and states that current technology allows determination of position to an accuracy of 125 meters as required by the Commission's E911 Order.[32] However, the Satellite Industry Association states that in order to meet the accuracy requirements of E911, GPS hardware would have to be included in the handset, adding significantly to service cost and hardware size.[33]

NTIA recognizes that the issues raised by the commenters are complex, but is concerned with delaying the implementation of position location and E911 capabilities in MSS terminals. In response to the pending *GMPCS NPRM*, the National Emergency Number Association (NENA) filed comments suggesting formation of a committee to study the possibilities of E911 implementation in GMPCS terminals.[34] NTIA supports NENA's suggestion and strongly recommends that the Commission create a fact-finding committee to explore the national and international ramifications of E911 capabilities in 2 GHz MSS terminals and coordinate its

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[30] Comments of Celsat America Inc., IB Dkt. No. 99-81, at 30 (June 24, 1999).

[31] *Id.*

[32] USCG Comments at 6.

[33] Comments of Satellite Industry Association, IB Dkt. No. 99-81, at 2 (June 24, 1999).

[34] Comments of National Emergency Number Association, IB Dkt. No. 99-67, at 2 (June 21, 1999).

activities with the ITU. Moreover, the Commission may benefit from offers made by public safety organizations to assist it with developing and implementing national and international standards and PSAP databases.[35]

VI. 2 GHz MSS TERMINALS SHOULD BE LABELED TO INDICATE E911 CAPABILITIES.

The comments submitted by the U.S. Coast Guard suggested labeling 2 GHz MSS terminals to indicate whether or not a given terminal has position location capabilities for making E911 calls. [36] NTIA believes this labeling approach would benefit the public by informing it that certain terminals cannot be used for E911 calls. Therefore, NTIA recommends that the Commission consider adopting this type of labeling system for MSS terminals operating in the 1990-2025 MHz band.

Respectfully submitted,

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[35] NENA offered to assist the Commission in these efforts. *Id.* at 2-3.

[36] USCG Comments at 10.